Quiz!

30 minutes (1:45-2:15)

Closed note, closed book

Come up and ask if you have questions.

Collaboration

CIS 7000

Andrew Head & **Danaé Metaxa**

Last time

Our default is to replicate offline social interaction; instead we ought to aim to go **“Beyond Being There”.** Create social spaces that could **only** thrive online

We struggle with **Grudin’s Paradox**, where the people needed are those with the least incentive to contribute, and we struggle with **cold start**

Social media’s effect on us depends on use:

- Directed interactions increase friendships and wellbeing, but liking does not
- Social media use does increase social capital in our communities
- We take in a broader news diet, but democracies struggle with polarization

Today

CSCW

- Distance Matters
- The Socio-Technical Gap
- Coordination at Scale: Crowdsourcing

CSCW: Computer-supported cooperative work

The traditional definition...

Computer-supported: technology is mediating the conversation

Cooperative: typically teams or groups of coordinating people

Work: tasks, as opposed to play or socializing

Johansen's time-space matrix

[Johansen 1988]

Time

Space	Same time	Different time
Same place		
Different place	zoom 	

Implication: the design will need to look very different depending on the quadrant that you're in

Design considerations differ by quadrant

Space	Time: Same time	Time: Different time
Same place	Managing shared, simultaneous ownership Backchannels	Visibility and permissions controls
Different place	Awareness indicators Presentation controls	Tools for managing inbox overload Filters, tools for managing your self-presentation

Match your design to the quadrant

Distance Matters

Coworker communication

[Kraut et al. 1988]

Studied communication between collaborating researchers at Bell Labs

Distance between offices and probability of research collaboration

Office location	Total pairs	% collaborating
same corridor	243	10.3
same floor	1038	1.9
different floor	1736	.3
different buildings	1261	.4

Result: Very significant falloff in collaboration as people get further apart. Even between same corridor and same floor.

Distance matters

[Olson and Olson 2000]

"If, as it is said to be not unlikely in the near future, the principle of sight is applied to the telephone as well as that of sound, earth will be in truth a paradise, and distance will lose its enchantment by being abolished altogether."
– Arthur Mee, 1898

But… **colocated software engineering teams outperformed the company average by 2x**. Why?

YOU READ THIS

Distance matters

[Olson and Olson 2000]

The big idea behind this paper: why is distance collaboration so much worse?

> This paper is the face that launched a thousand ships in CSCW—analogous to The Computer for the 21st Century in interaction—cited as motivation for nearly every study of remote collaboration

The Olsons's identified challenges:

> **Common ground:** knowledge that people have in common and know they have in common
>
> **Coupling:** how complex the work interdependencies are

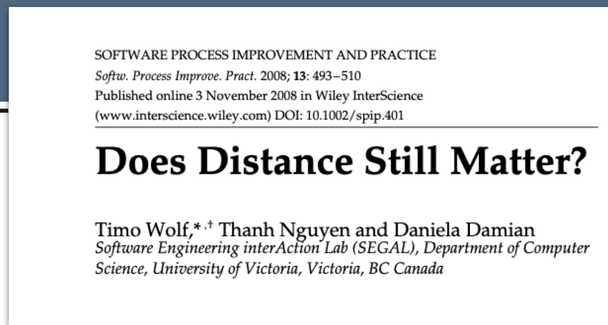
Surely not even today?

The tools have improved – Zoom, GitHub, Slack, Asana — does distance really still matter?

You're not the first one to ask this question…

Distance Matters

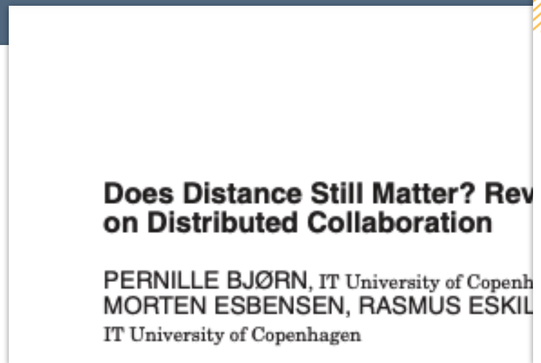
Gary M. Olson and **Judith S. Olson**
University of Michigan



SOFTWARE PROCESS IMPROVEMENT AND PRACTICE
Softw. Process Improve. Pract. 2008; **13**: 493–510
Published online 3 November 2008 in Wiley InterScience
(www.interscience.wiley.com) DOI: 10.1002/spip.401

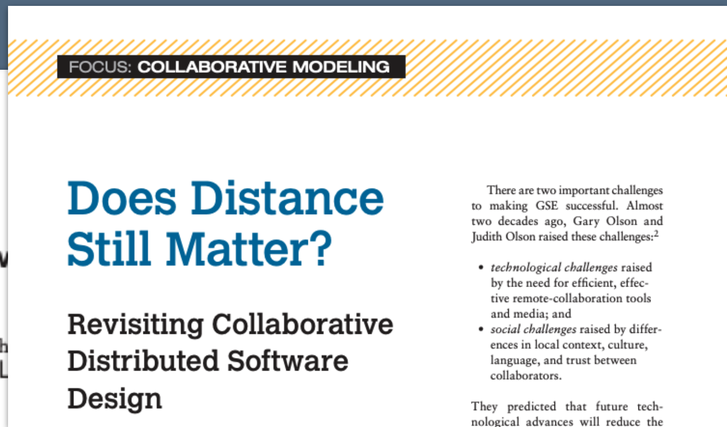
Does Distance Still Matter?

Timo Wolf,*,† Thanh Nguyen and Daniela Damian
Software Engineering interAction Lab (SEGAL), Department of Computer Science, University of Victoria, Victoria, BC Canada



Does Distance Still Matter? Rev
on Distributed Collaboration

PERNILLE BJØRN, IT University of Copenh
MORTEN ESBENSEN, RASMUS ESKIL
IT University of Copenhagen



FOCUS: **COLLABORATIVE MODELING**

Does Distance Still Matter?

Revisiting Collaborative Distributed Software Design

There are two important challenges to making GSE successful. Almost two decades ago, Gary Olson and Judith Olson raised these challenges:[2]

- *technological challenges* raised by the need for efficient, effective remote-collaboration tools and media; and
- *social challenges* raised by differences in local context, culture, language, and trust between collaborators.

They predicted that future tech-
nological advances will reduce the

Surely not even today?

THE UPSHOT | Do Chance Meetings at the Office Boost Innovation? There's No Evidence of It.

At the same time, technology — like Zoom, Slack and Google Docs — has made idea generation as effective online, researchers said. Judith Olson, a professor of computer science at the University of California, Irvine, has studied the effect of distance on teamwork for three decades. Distance matters much less now, she said: "Because of the technology these days, we're actually inching closer and closer to replicating the office."

[New York Times 2021]

Yes, even today. [Hu et al. 2022]

Ten month ethnography of a large national laboratory during COVID remote work

Team collaboration is now somewhat fluid using remote collaboration technology…

> But the same tools **are breaking collaboration across teams**.
>
> The collaboration tools and practices that help individual teams thrive (e.g., custom tools) make it harder at the organizational level (e.g., inability to share or interoperate)…and visa-versa

but… why?

Media richness theory

[Daft and Lengel 1986]

Collaboration media offer reduced cues relative to in-person interaction

- **Videochat**: can't see the environment or whole body language, eye contact
- **Text chat**: can't see facial expressions or gestures, can't hear intonation

Richness is ability of the channel to transfer and recreate the signals that the person is sending: e.g., cues, feedback

Claim of MRT: richer media are more effective for collaboration and working through challenging issues

Out of sight, out of sync

[Hinds and Bailey 2003]

Remote teams experience more conflict. Why?

- Remote teams are generally less homogeneous than in-person teams, and lack shared context (e.g., norms)
- Distance reduces familiarity and friendship and offsets temporal rhythms, leading to both affective conflict and process conflict
- Technology leads to uneven information, negative relational effects, and coordination difficulties, all of which lead to affective conflict

The Socio-Technical Gap

Why are collaboration and social tools resiliently difficult to get right?
Will distance ever not matter?

The intellectual challenge of social computing [Ackerman 2000]

"The social-technical gap is **the divide between what we know we *must* support socially and what we *can* support technically**."

The social sciences teach us mechanisms that are important for effective social interaction. But we lack designs that facilitate those mechanisms.

Intuitively: we know how to throw parties IRL, but generally not how to provide those same mechanisms online.

Socio-technical gap in collaboration tools

Social sciences: effective collaboration requires that people be aware of what on the team others are up to [Mathieu et al. 2000]

But how do we support awareness, in practice, with technology?

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CHI '92 May 3 - 7, 1992

Portholes: Supporting Awareness in a Distributed Work Group

Paul Dourish *Sara Bly*

Live feeds? [Dourish and Bly 1992]

Activity indicators? [Biehl et al. 2007; Roseman+Greenberg 1996; Dabbish et al. 2012]

Gap: between the awareness we need, and what we know to build

Socio-technical gap in social media

Social sciences: social activity is nuanced, and people handle the details with remarkable fluidity and agility [Ackerman 2000; Garfinkel 1967; Heritage 1984; Suchman 1987]

The focused totality of decades of design & technological progress:

Gap: …but what is a specific design that can better enable what we know to be effective interpersonal interaction?

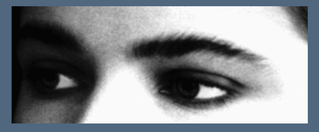
Collaboration beyond being there: modern frontiers

What's in team performance?

[Woolley et al. 2010]

Across tasks—ranging from brainstorming to execution to coordination—there exist stable factors predicting over 40% of the variation in team performance: a "collective intelligence factor". Guess what they are?

Nope, not the average/max intelligence of group members

The average **social sensitivity** of group members  

Equality of conversational turn-taking

↑% of women in the group (mediated by social sensitivity)

This lecture could have been an email [Cao et al. 2021]

Microsoft researchers investigated their own employees' own multitasking during remote meetings: e.g., are they using Outlook while in a Microsoft Teams meeting?

> Consistently ~30% of meetings involve email multitasking. The odds go up by 2x if the meeting is at least ten people and by 3x if the meeting is ~1hr long
>
> Multitasking does not mean disengagement: often, it's communication with colleagues or finishing other work: "It needs to happen or you can't get all your work done"

Open questions

Can we bring the right people together, given the task?

- People initially say they want experts and sociable teammates, but ultimately are likely to choose prior social connections [Gómez-Zará 2019]

Can we help them flag potentially explosive meltdowns early?

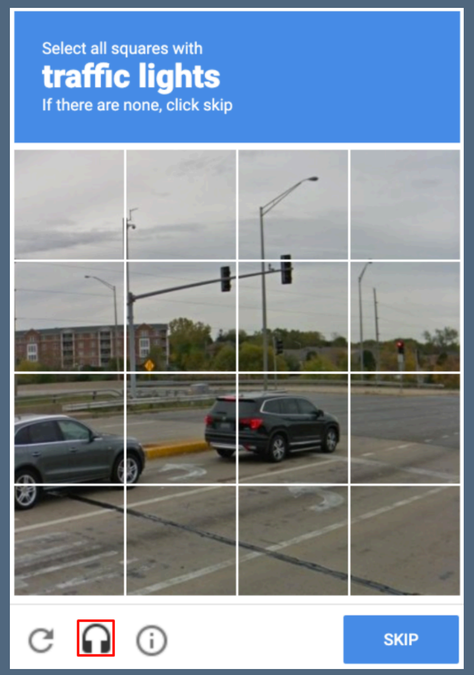
- As little as one minute of text chat can enable an algorithm to flag teams that may want to break up later [Cao et al. 2020; Zhang et al. 2018]

Coordination at scale: crowdsourcing

Large-scale contributions

"Well, If we can't coordinate in small groups, instead let's highly structure our activities and open them up to massive scale."

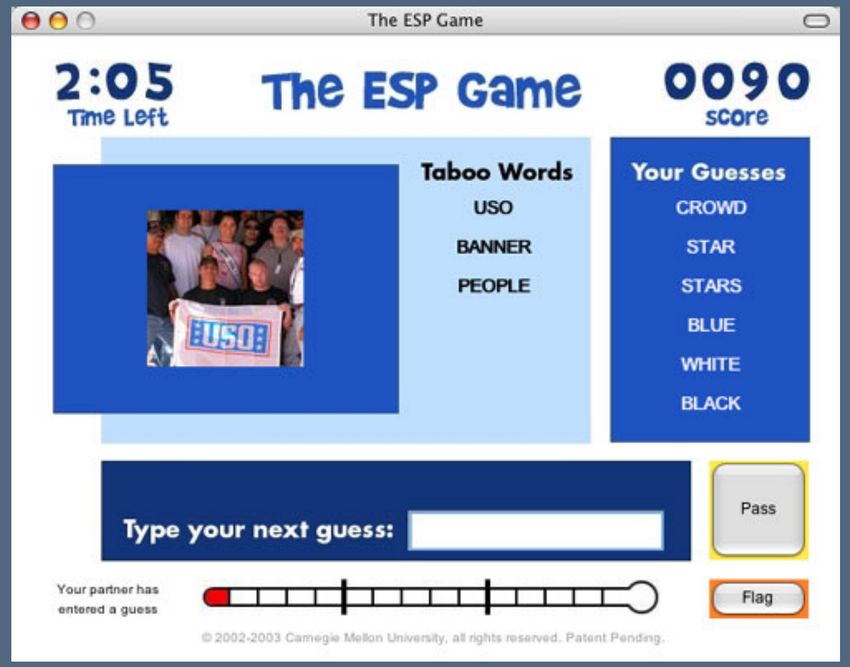
That's called **crowdsourcing**



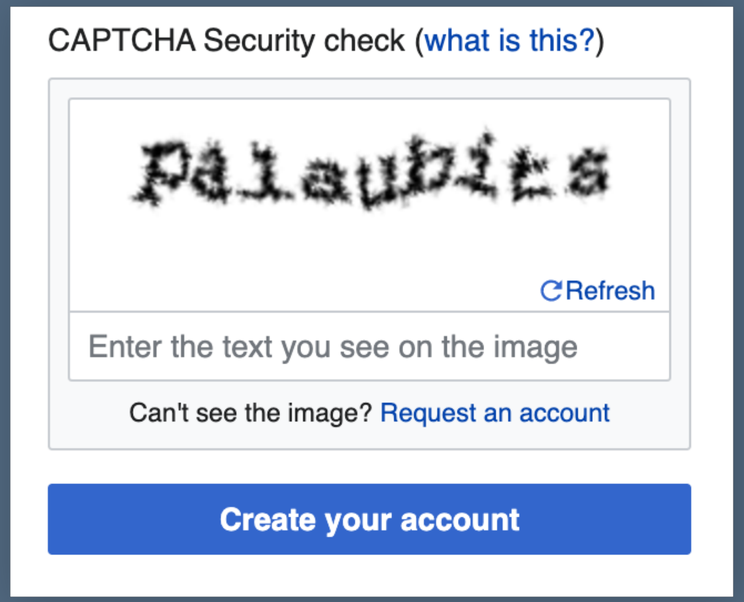
Large-scale contributions

"What if people don't want to volunteer?"

"Well, we could make it fun or incentivize them."



[von Ahn and Dabbish 2004]



[von Ahn et al 2003]

duolingo

[von Ahn 2013]

Large-scale contributions

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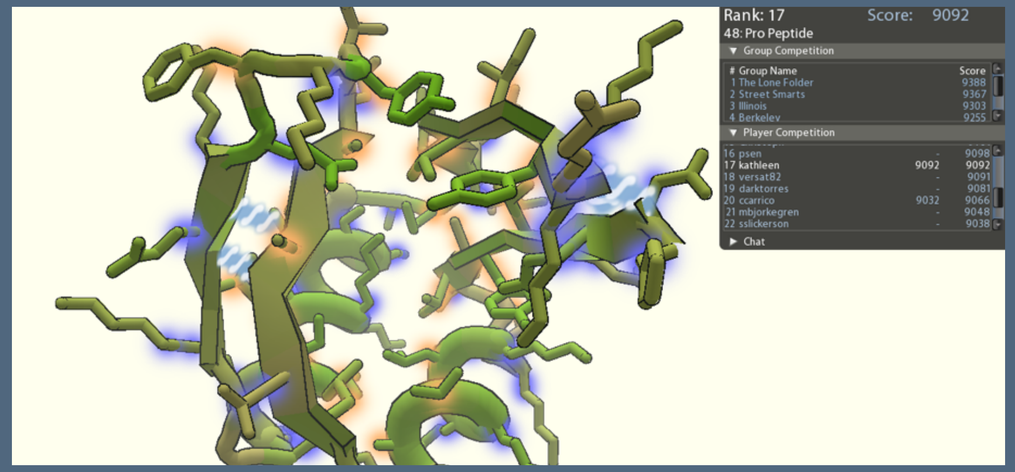


[Cooper et al. 2010]

FoldIt — protein folding video game

Game Science x Biochem

Users try to fold proteins perfectly; highest-scoring proteins are analyzed by scientists

Crowdsourcing as Beyond Being There

Crowdsourcing gives up on having high common ground and coupling (vis a vis Olson), in favor of structured activities at scale

"Write a complete encyclopedia article" → "Fix this typo"

"Create a complete operating system" → "Try to fix this issue/bug"

"Train a machine learning algorithm" → "Label this image"

What crowdsourcing loses in coordination from in-person collaboration, it gains in sheer scale — going beyond being there

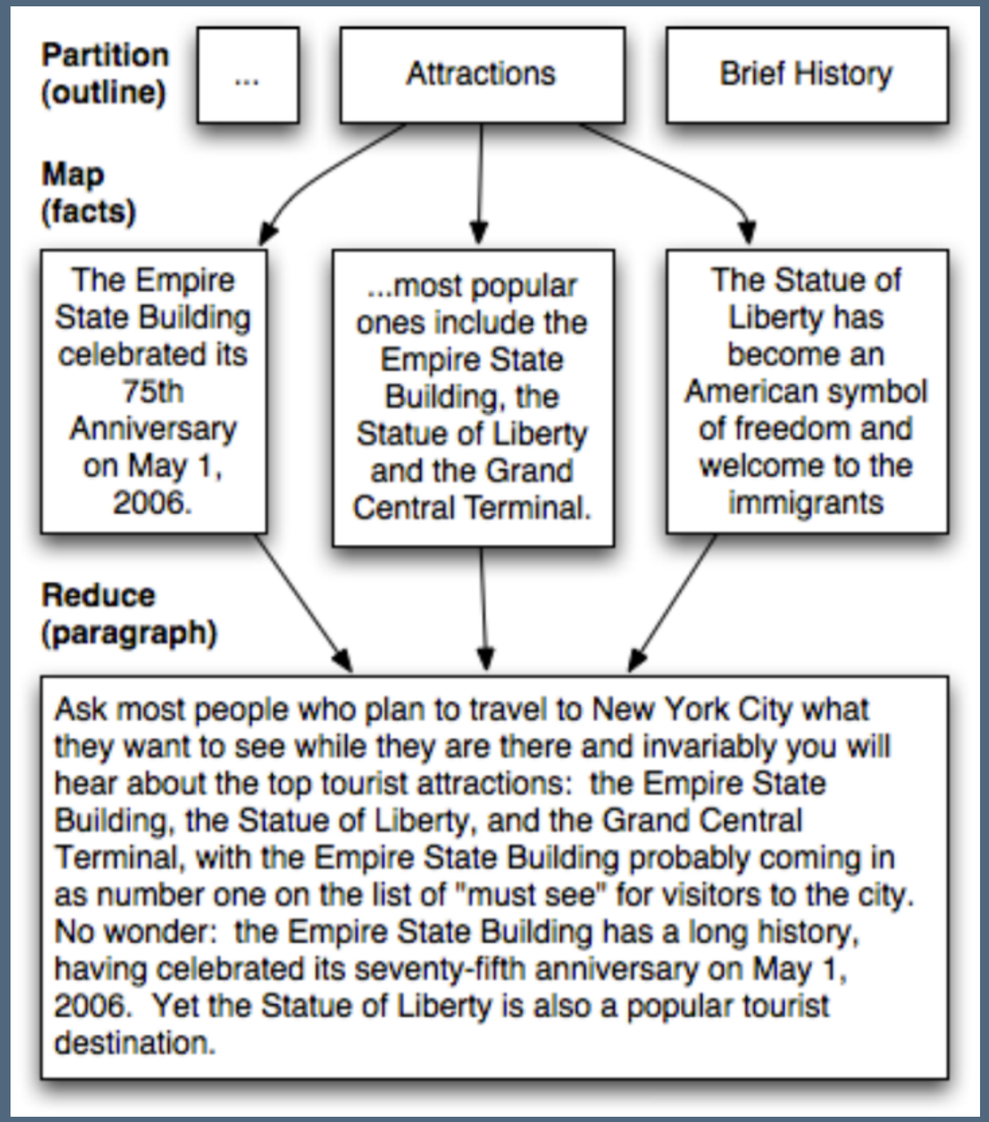
Crowdsourcing workflows

[Kittur et al., UIST '11]

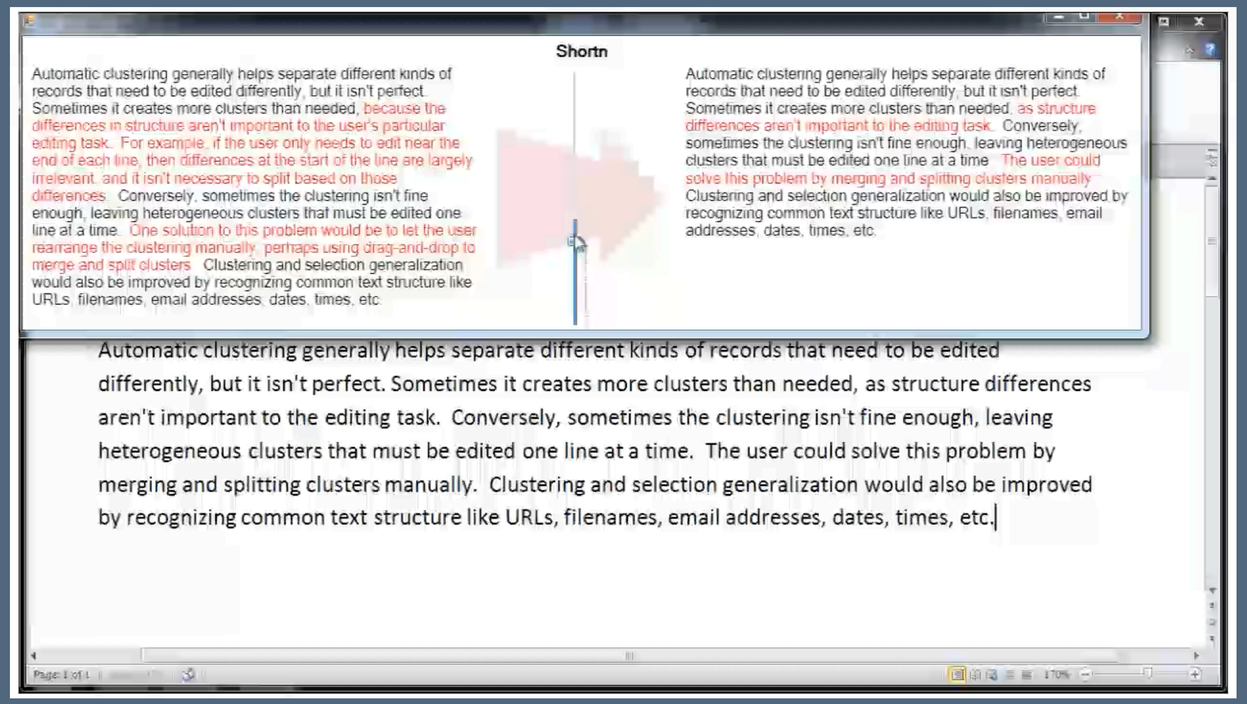
How might we crowdsource more complex, interdependent outcomes?

Crowdsourcing as a map-reduce process

To write a Wikipedia page, partition on topics, map to find facts and then reduce into a paragraph

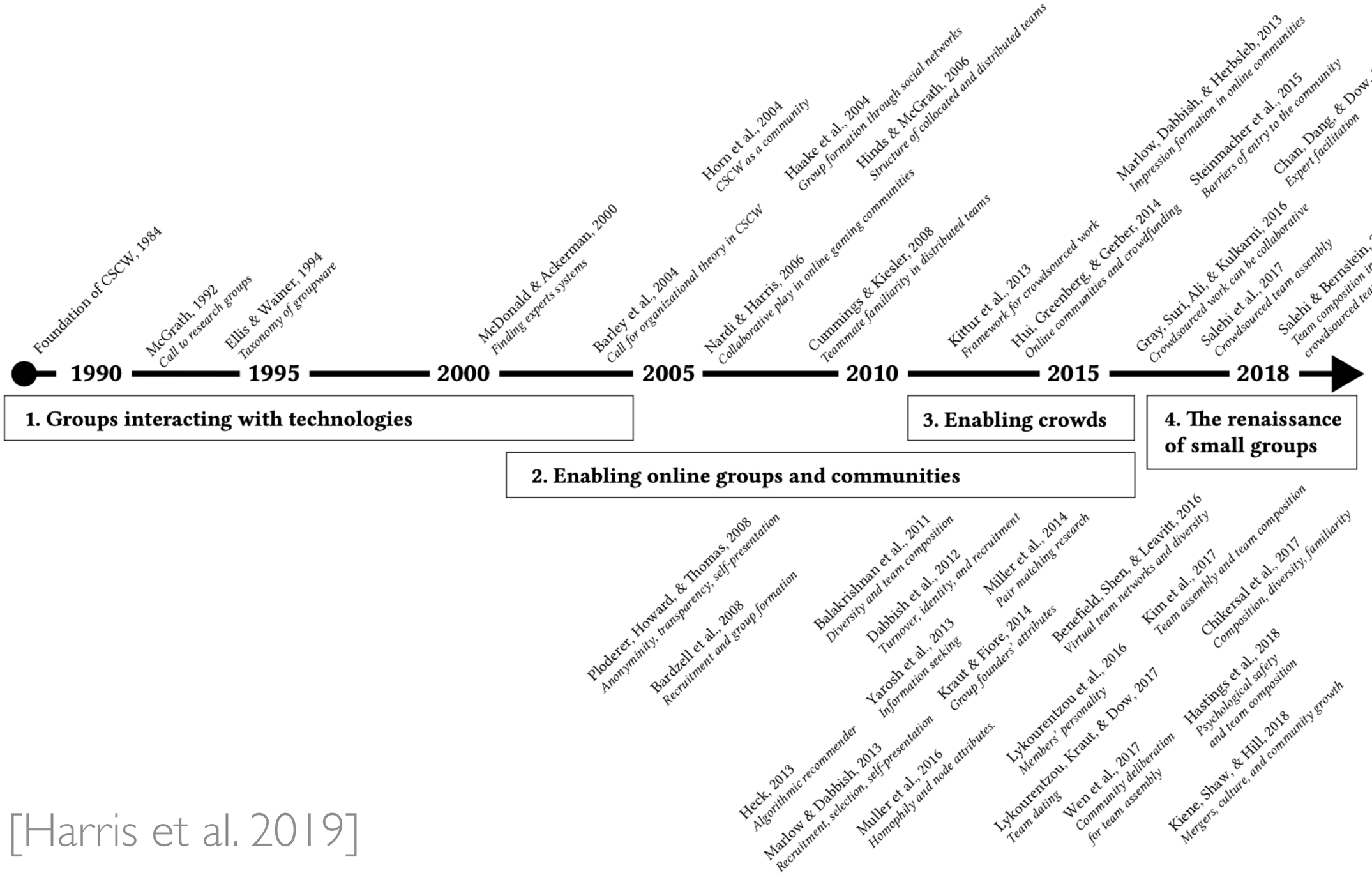


Crowd-powered applications



[Bernstein et al. 2010]

[Bigham et al. 2010]



[Harris et al. 2019]

Summary

Collaboration is hard: **distance matters**.

Tools can try to mitigate the effects of distance, but we are limited by the **socio-technical gap**.

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